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November 14, 2019

Diane Salkie
U.S. Environmental Protection Agency (USEPA)
Region II Headquarters
290 Broadway, 18th Floor East
New York, NY 10007

Re: Lower Passaic River Study Area (LPRSA) – 17-Mile RI/FS Project
Newark City, Essex
SRP PI# 332799
Activity Number Reference: RPC030001

Dear Ms. Salkie:

Introduction

The New Jersey Department of Environmental Production (Department) is grateful for the opportunity to present project observations, concerns and questions, and receive guidance from the members of the Contaminated Sediment Technical Advisory Group (CSTAG) and the National Remedy Review Board (NRRB). The Department appreciated CSTAG's prior recommendations, dated April 25, 2018, which addressed many important aspects of the Cooperating Parties Group's (CPG's) original November 2017 Interim Remedy proposal and reflected many of the Department's comments and concerns, dated February 13, 2018. The April 2018 CSTAG recommendations continue to guide this project as the Feasibility Study (FS) has developed.

Background

Along with the USEPA and the local community, the State of New Jersey has been heavily invested in the Diamond Alkali Superfund Site since its first discovery in 1983. As with most sites, initial focus was on containment and remediation of upland conditions to abate immediate public health direct contact threats. Once those threats were abated and longer-term remedial paths established, our collective attention (local community, USEPA and NJDEP) turned towards the river in a more focused way in the 1990's. Information on river characteristics has been collected and assessed since that time forward.

As you know, within the US and possibly around the world, this river is considered uniquely enriched with this particular congener, still regarded as one of the most toxic synthetically-derived organic compounds known to exist. Previous controversy regarding degree of dioxin's toxicity and its mechanism for same has largely been resolved by over 40 years of intensive dioxin toxicological research conducted by the USEPA and other Public Health Agencies within the US and around the world -- which confirmed that this class of compounds are

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indeed highly toxic to organisms exhibiting a specific, common mechanism of toxicity, and as a result, are capable of eliciting cancer and wide-ranging non-cancer impacts at very low doses. This resulted in development and worldwide acceptance of the Toxic Equivalency Method (TEQ) to address chlorinated dioxins, furans and dioxin-like PCBs as a collective group of contaminants of special environmental concern at contaminated sites.

In 2016, after approximately thirty years of study, involving progressive expansion of site boundaries and increased understanding of river conditions, the Remedial Investigation and Risk Assessment phase for the LPR was drawing to a close, having collected the information necessary to understand the key physical and chemical characteristics of this river and the associated unacceptable human health and ecological risk posed by these conditions, pursuant to CERCLA. The next step, development of the Feasibility Study was just beginning. At approximately the same timeframe, in March 2016, the USEPA issued a final remedy Record of Decision (ROD) for the Lower 8 Miles of the Lower Passaic River, OU-2, which the NJDEP supports. With this action, viewed as the first major action to begin impactful river cleanup and restoration, the remedial focus for the rest of the river, OU-4, became the upper 9 miles of the LPR.

In October 2018, after a long negotiation period by the working parties, and with the support of specific recommendations by CSTAG issued in April 2018, the NJDEP gave support to the USEPA to move forward with the OU4 Project transitioning from a traditional CERCLA RI/FS process, to an Interim Remedy project with specific agreed-upon conditions by EPA Region 2. These tenets stem from the Department's firm resolve that, to the extent feasible, this interim remedial action to be embodied in ROD 1 ***should be sufficiently designed to definitively meet the project RAOs (December 2018) to best support this action being the only in-river action needed for follow-on Monitor Natural Recovery (MNR) to reach future risk-based goals in a reasonably-acceptable timeframe, i.e., approximately 10 years, post ROD 1 implementation and success prove-out.*** Given the current project schedule for IR design and construction ending at approximately 2028, this means attaining risk-based goals in the upper 9 miles of the river by 2038 or soon thereafter. The Department's agreed-upon tenets to support this objective are as follows:

- That the requirements and work products of the current RI/FS remain open and active (primarily referring to PRG development), with the original schedule to be maintained to the extent possible; these actions will still need to be met through a future final ROD;
- A goal of the Interim Remedial Action will be to achieve a post-remedy SWAC of either 65 ppt, 75 ppt or 85 ppt from river mile 8.3-15; the alternatives developed and evaluated in the feasibility study will represent these three post-remedy SWAC goals;
- By reducing the total PCB SWAC from river mile 8.3 to river mile 15 to below established background concentrations, reported as 460 ug/kg, or 0.46 ppm;
- The post-remedy SWAC will be achieved on Day 1 post-Interim Action Remedy, meaning, demonstrated soon after construction completion and not met through evaluation of future deposition of clean sediment;
- The feasibility study will consider alternatives which include dredging to clean sediments where feasible to lessen the need for capping, and its associated institutional controls and long-term O&M in these areas.
- As part of the feasibility study, the method to be used for demonstrating attainment of Interim Remedy Remedial Action Objectives and the post-remedy SWACs for total PCBs and 2,3,7,8-TCDD will be discussed; the principles for implementation will be developed and agreed upon by USEPA and NJDEP and reflected in the feasibility study, Proposed Plan, and ROD.

Remedial Investigation Report Observations

Detailed information on the remedial investigation has already been provided for your consideration. The following summary is provided because the conditions to be described underscore the Department's later comments on needed improvements to the remedial strategy:

1. Extremely high levels of 2,3,7,8-TCDD (approximately 900 ppt, with some areas revealing 30,000 – 50,000 ppt) exist in surface and subsurface sediment within the Upper 9 Miles of the LPR, RM 8.3 – RM 15. However, concentration patterns have revealed two important distinctions: Within the navigational channel, the dioxin concentrations tend to increase with depth to depths of 10 ft or more, whereas, in the shoals, especially the mudflats (i.e., areas of special exposure concern), the maximum dioxin concentrations are often found in surface sediment. In these areas, the dioxins tend to decrease across a steep concentration gradient with depth to dissipate to background levels within several feet (3 – 5 ft.). Although "maximum" levels are often found below the top 6 inches in many regions of the overall sediment bed, the existing dioxin surface concentrations ranging from hundreds to thousands ppt, remain several orders of magnitude above background conditions and anticipated risk-based levels.

2. For the Lower Passaic River, even though river sediments are contaminated with a multitude of toxic organic and inorganic contaminants, the vast majority of assessed unacceptable risks (generally over 80%) to both human and ecological receptors throughout the entire LPR (RM 0 – RM 17.4) are considered attributable to the presence of this single congener, 2,3,7,8-TCDD.

3. For perspective, background levels of 2,3,7,8-TCDD in soil and sediment are generally less than 10 ppt and very often less than 1-2 ppt, as observed for this river. The existing risk-based derived remedial goal for the lower 8 miles of the LPR, OU 2, is 8.3 ppt.

4. Given the very high levels of 2,3,7,8-TCDD in sediment, and the unabated mobility of these contaminated sediments, the river is not recovering on its own at an acceptable rate. Data from 1995 to present have indicated that despite the high influx of surface water flow and associated cleaner sediment from upstream areas, the highly contaminated fine silts within the river continue to behave as an ongoing chemical discharge, becoming re-suspended and re-distributed throughout the system.

5. The river's complex hydrodynamic forces impact sediments on a fine spatial scale and differently in larger flow events (such as Hurricane Irene) and smaller flow events. This has hindered our ability to readily distinguish between consistently "active" versus "passive" mobile riverbed sediment regions. As a result, it is sometimes difficult to differentiate with clear certainty those areas that are: a) predominately erosional, versus b) those predominately depositional, and c) areas which cycle between erosional and depositional characteristics, depending on the different types of "events" which exert physical stress on the system (high freshwater flows, strong tidal surges, etc.)

6. There are limitations in definitively categorizing areas as depositional, erosional, or cyclically erosional and depositional because:

- Erosion and deposition occur at a finer scale than is represented by the RI/FS fate and transport model, and are not consistent through all events.
- Erosion or depositions of less than 6 inches is not reliably detected by current bathymetric methods, but changes of this magnitude matter due to the high dioxin concentrations described above.
- Bathymetric information to quantify erosion and deposition is currently lacking for a portion of the sediment surface located in shallow shoal areas.

7. The upper 9 miles of the river have been shown to have less solids trapping potential for fine solids than the lower 8 miles (Isrealsson et al., 2014, Estuaries and Coasts (2014) 37:1145–1168), implying lower recovery potential. This is likely due to a smaller channel cross-section in the upper 9 miles, implying higher velocities and sheer stresses, reducing the ability of suspended sediment to settle in the channel.

Community Interest and Current and Future Uses:

Since 1984, there has been, and continues to be, a very high interest by the State of New Jersey and surrounding communities to "Bring this River Back" into safe, healthful and productive use for all receptors, human and ecological. This is evident by the highly-engaged and knowledgeable CAG, and the Ironbound Coalition Group before them, which continue to push for appropriate attention and resources for this project, aimed at improvements to the river's remedial process and ultimately, a restored healthful state. The Department supports the CAG's recent comments to you for this meeting and find that the CAG and this Department share the same key concerns regarding Interim Remedy implementation and prove-out (i.e., Completion Demonstration).

Wide community interest in this project is also evident by the Municipal Master Plans by communities bordering the river which have shifted local land planning efforts towards creating more river-focused recreational parks and other public areas to allow greater access to and enjoyment of the river. This is seen by new park infrastructure that celebrates the river-community connection, such as the expanding "Orange Sticks" Riverwalk park in Newark. There are active, competitive high school rowing teams which train on this river. There are existing Public and Private Marinas which have expressed interest in enhancing their facilities to allow improved access to the river by the public. The City of Newark hosts annual canoe and kayak events to increase public awareness and enjoyment of this tremendous resource in their community. The National Park System initiated plans to create a water trail from areas upstream in the Passaic River to Newark Bay. And, finally, interest in this river has also been evident by the large amount of resources that this Department has invested and dedicated to this project through in-house staff and outside technical experts.

The remarks thus far provide the backdrop to Department's comments on the current remedial strategy for your consideration.

Improvements to Remedial Strategy – The Upper 9 Mile Interim Remedy (IR)

1. The State supports the pairing of construction phases for both the OU2 lower 8-mile *final* remedy and OU4 upper 9-mile *interim* remedy for three main reasons:
   a. Project pairing will allow potential sharing of equipment and services for sediment excavation, treatment and transportation, thus *saving substantial remedial costs*,
   b. Project pairing is expected to reduce the duration of river disturbance, *thus reducing negative impacts on surface water quality* and impacts on ecological receptors within the river and downstream.
   c. Project Pairing is expected to reduce overall disturbance to surrounding communities due to a shortened construction timeframe, *thus reducing demand on local modes of transportation, reducing the length of time of potential excess construction-like activity*, involving excess noise, dust, lighting and odors that sometimes are associated with remedial projects.

2. However, equally important to this Department, is that the Interim Remedy, as captured in ROD 1, will materially meet the project's Remedial Action Objectives, as agreed to by all parties in December 2018. These Remedial Action Objectives were collaboratively developed during the FS working group meetings, comprised of representatives from the CPG, USEPA and NJDEP, and successfully captured many of the key tenets

stipulated by this Department (as described previously, October 2018) for supporting the transition to an Interim Remedy. **However, in light of project uncertainties collectively acknowledged, we urge careful selection of a preferred IR remedial alternative, and then application of conservative parameters during design and construction of the selected remedy. This precautionary approach is considered essential to ensuring that the project's remedial goals are, in fact, met**. This position is based on the view that although this is an interim remedy – it essentially reflects the expected key features that will comprise a future final remedy for this river; meaning, hot spot removal and capping of problematic highly-impacted silt beds, followed by MNR to reach risk-based goals. This is the type of remedial action that was anticipated if we had stayed with a traditional RI/FS, forward-guided by risk-based remedial goals. The difference here is that, absent Preliminary Remedial Goals (PRGs), we are incorporating MNR sooner in this remedial process by first conducting a source removal action that assuredly reduces the SWAC within RM 8.3 to 15 from ~900 ppt to less than 85 ppt. But in doing so, we consider it essential to demonstrate that the post-remedial SWACs as represented in the RAOs for both Dioxin and PCBs have been met with a high degree of confidence. The Department is currently in negotiations with the USEPA and CPG on the manner this will be done. This will be discussed later in the presentation.

3. This IR serves as a model for both active and future remediations in New Jersey and across the country; thus, careful consideration is needed as the agencies consider both the technical basis and policy considerations of the project.

While the FS has been successful in capturing many of the Department's October 2018 tenets, there are 4 specific topics that the State is raising to your attention for guidance to improve both the remedial process and outcome for this project. These include:

a. Comparative Analysis of the FS Alternatives
b. Cap design protectiveness for increasing frequency and strength of storms
c. Application of Adaptive Management
d. IR Completion Assessment

a. Comparative Analysis of FS alternatives

The Department believes that the FS overlooked important differences among the 3 viable alternatives: Alternative 2, design target of 85 ppt; Alternative 3, design target of 75 ppt and Alternative 4, design target of 65 ppt. (note: Alternative 1, no action and Alternative 5, design target of 125 ppt are discounted.) The FS identifies that, based on many of the balancing criteria, differences are indistinguishable among the 3 viable alternatives. However, differences are distinguishable, as will be described below. During the review of the FS, the Department provided comments that highlight: 1) quantitative differences that have been overlooked, and 2) an additional criterion that should be incorporated for alternative comparative analysis.

1) Within the comparative analysis of the alternatives (8.4.2 Primary Balancing Criteria) modeled outcomes for the 10 years following completion under alternatives 2, 3, and 4 are compared and it is asserted that "the degree of SWAC reduction at the completion of construction does not result in appreciably lower SWACs in the 10 years following construction (Figure 8-5)." The Department considers this conclusion inaccurate. As reported in FS Table 7-1, these three alternatives are expected to achieve respective SWACs of 80, 70, and 60 ppt 2,3,7,8-TCDD. The alternatives that set lower targets would achieve lower SWACs as intended. As reported in the same paragraph, Figure 8-6 shows comparable rates of recovery for these three alternatives in the 10 years following construction. This indicates that the successively **greater post-construction source control** achieved by alternatives 3 and 4, relative to alternative 2, would persist through the first 10 years after construction, resulting in lower SWACs at the end of the period, and earlier achievement of risk-based targets under

subsequent natural recovery. The Department considers this a significant finding that is currently unaccounted for in the comparative analysis of alternatives. The Department's recommendation is that this difference among alternatives is accounted for within criterion 3, Long-Term Effectiveness and Permanence.

The same paragraph notes that the "projected differences among the post-IR SWACs for Alternatives 2, 3, and 4 are within the range of the model sensitivity projections", referring to Figure 8-4, and asserts that "the similarity in model projections of sediment SWACs suggests that Alternatives 2, 3, and 4 would provide the same levels of source control, and the uncertainty in model inputs and parameterization precludes concluding that the very small differences in the projected SWACs are meaningful." This conclusion contradicts the statement on FS Page 6-2 that "Overlap [in the range of Post-IR concentrations] is not in itself presumed to render alternatives indistinguishable."

The FS sensitivity projections were developed by modeling Alternative 3 (75 ppt) under the base case contaminant maps (CS 37) and two bounding cases (CS 57 and 81); then determining the percentage differences in the three cases in each year; and finally applying the same percentage differences to the other alternatives to represent the high and low cases. It is shown that the modeled SWACs in each year are sensitive to the preconstruction contaminant map assumed and that Alternative 4 produces lower SWACs throughout the modeled period when a more favorable starting condition such as contaminant map CS 81 is assumed, and higher SWACs throughout the modeling period when a less favorable starting condition such as CS 57 is assumed. This section does not demonstrate the same level of source control under Alternatives 2, 3, and 4 for any specific set of assumptions, nor does it propose any specific circumstance where the level of source control might be the same for each alternative.

The FS Executive Summary, Section 8.4. on Cost, and Section 8.5 Comparative Analysis Summary, all repeat the incorrect inference that the three alternatives provide the same level of source control. The intended and quantifiable differences in source control shown in the modeling results should be acknowledged and weighed against the other balancing criteria in the Comparative Analysis.

2.) Similarly, given inherent limitations on how well existing models are able to simulate actual river conditions, along with known and anticipated variability in sediment data, the Department is advocating for consideration of a criterion addressing "potential likelihood of exceeding RAO1". Although the FS identifies that all selectable alternatives (Alternative 2 – 4) have the possibility of meeting the RAO goals, varying probabilities of exceeding RAO1 are present. Alternative 4 is considered least likely to exceed RAO1, whereas, Alternative 2 has a higher likelihood of exceeding RAO1 over Alternatives 3 and 4. The Department's recommendation is that this difference among alternatives is accounted for within criterion 5, Short-Term Effectiveness.

b. Cap Design & Protectiveness for Increasing Storms

The Department is concerned with increasing storm severity and potential flooding as it relates to capping for remedial projects. In the LPRSA, a 100-year storm event was assumed for the cap in the Lower 8 ROD. In addition, a 100-year chemical isolation was used in the IR design of the RM 10.9 cap. As storm severity and flooding is expected to increase, considerations for cap design should be informed by modeling for a time period beyond 100 years (200 or 500 years), as the planned engineered cap in the LPR upper 9-mile region will need to maintain physical and chemical isolation integrity in perpetuity. (Please also see the Department's concerns on FS Appendix H, regarding implementation of RAO 2 for subsurface sediments.)

c. **Adaptive Management**

Appendix D of the Draft FS comprises CPG's proposed Adaptive Management (AM) Approach for this project. This approach comprises 3 primary elements, which can be grouped as:

- development of PRGs, Element 1
- assessment of near and longer-term post remedial conditions, Elements 2 and 3

However, the Department believes there is increased value in analyzing AM opportunities within each remedial phase, as follows:

IR ROD 1 Design: Identify the key uncertainties which may limit success of the design work to engineer the primary elements of the IR. *This involves testing existing hypotheses and re-evaluating site assumptions used during the FS stage that led to ROD 1.* At this point, AM is utilized to promote ROD 1 success in attaining RAOs. In addition, the necessary information for PRG development are collected so PRGs are generated during this phase. This retains the prior anticipated schedule of PRG development within ~2 years of RI and risk assessment completion.

IR ROD 1 Implementation: Similarly, identify the key uncertainties and features of IR construction that may limit the success of the IR in attaining RAOs. Again, this involves testing existing hypotheses and re-evaluating site assumptions used during design that led to the size/shape/processes used for construction. This allows for capturing appropriate adjustments *during construction* to keep the project on track for RAO attainment.

Post-ROD 1 Recovery Monitoring to achieve RGs: The focus at this stage is for obtaining data most representative of the recovery process. Adjustments/improvements in modes of monitoring may occur, provided these still allow for parallel long-term trend analyses. In addition, if recovery is progressing slower than anticipated, diagnostic assessments and supplemental data collection may occur.

Again, we believe the AM approach would be more effective if organized in the fashion just described. In addition, I'd like to highlight two principle topics within the currently proposed AM program for which adjustments are highly recommended: PRG development and Improvements to CSM assumptions:

1. PRG development is considered a separate and parallel effort within the ROD 1 Design phase. The Department believes that existing uncertainties hindering development of PRGs can be identified and addressed within the design phase. This involves identifying specific testable hypotheses and acting on them to confirm or adjust assumptions.

The Department disagrees with two aspects of CPG's current AM proposal for PRGs:

a. that a *range of PRGs* would be developed and periodically refined, and

b. that this "refinement" could occur over the course of an extended timeline (~ 20 yrs.).

This approach to PRG/RG development prevents the use of these important goal posts from *effectively guiding* AM for this project once ROD 1 is implemented. As with all Remedial Projects (Federal or State), PRGs need to be developed as soon as feasible. Once established, PRGs and the subsequently-selected RGs, comprise the key metrics by which remedial success is judged. And, because PRG development is always done through careful evaluation of site-specific conditions, unless new and significantly-different information comes to light, PRGs are not expected to undergo revision once established.

As you may be aware, the Department does not support the final Baseline Ecological Risk Assessment (BERA). Although we agree that unacceptable ecological risks were identified pursuant to CERCLA, the necessary pre-PRG step of quantitative contaminant-receptor pair risk characterization was not fully completed. Instead, a range of risk estimates, stemming from the use of two different toxicity reference value sets (each with their

own NOAEL and LOAEL values) for specific contaminant-receptor pairs are presented. In the Department's view, this approach for risk characterization within the BERA is not sufficiently protective of sensitive receptors and contributes to the current, unacceptable FS proposal to generate a "range of PRGs" for this project. The additional confusion that a range of PRGs will introduce to this already complex project is considered unproductive to remedial progress.

In summary, PRGs and final RGs should be developed as soon as feasible; the information needed to do so must be prioritized for collection early in the overall project timeline and completed during the design phase.

2. Conceptual Site Model (CSM) Assumptions: FS Section 2.6 presents the Source Control CSM and includes a number of important testable hypotheses as follows:

• Natural recovery of surface sediment COC concentrations occurs principally as a result of lower concentration depositing particles burying surface sediment or diluting surface sediment via cyclical erosion and deposition.

• The rate of recovery is likely controlled by net erosion of higher concentration sediment and cyclical erosion and deposition that bring higher subsurface concentrations into the surface layer.

• Sediment is a net source to the water column where sediment concentrations are greater than those found on particles depositing from the water column.

FS Appendix D (AM), Section 4 states its hypothesis for Adaptive Element 2 in more general terms: "Is the system response [to] the source control IR consistent with the CSM and numerical models?"

Under Element 2, LTM data are used to evaluate the numerical model as the embodiment of the CSM. Biota, water column, and sediment chemistry would be collected annually, sediment chemistry approximately every five years, and bathymetry periodically, i.e. following a high-flow event. These data would be used to compare recovery to model projections. Diagnostic data collection would be triggered *after a series of five-year review cycles*, if the system is responding more slowly than indicated by the range of model projections. Figure 4-1 shows the reevaluation of the CSM commencing in 2041.

However, the CSM rests on specific hypotheses about the existence of depositional and erosional areas of sediment, and movement of contaminants from erosional to depositional areas on particles delivered via the water column pathway. Uncertainties pertaining to these specific hypotheses are considered the most critical hypotheses to the reliability of the CSM. It is unclear how the proposed collection of LTM data could support testing of these specific hypotheses or reduce the uncertainty surrounding them. It appears that LTM will be focused solely on developing data trends to compare to numerical model trends. It also appears that the Adaptive Management Plan begins collecting diagnostic data for Adaptive Element 2 at a very late stage. Data to relate trends to underlying processes take years to collect, so Figure 4-1 is overly optimistic to envision data collection and CSM evaluation to be completed in 2 years (2043).

To facilitate a more timely and effective diagnosis and adaptation, if ultimately needed, the Adaptive Management Plan should be more explicit about the hypotheses that make up the source control CSM, providing a road map for the most informative water column, sediment, and bathymetric data to be collect as part of LTM to test those specific hypotheses, if and when a diagnosis is needed.

Similarly, FS Appendix D, addresses Long Term Monitoring and System Recovery, Element 3, in similarly general terms: The hypothesis states: "Is recovery progressing in media of concern to reach protective levels within a reasonable time frame?"

Adaptive Elements 2 and 3 are closely related, and earlier data collection to support testing of the hypotheses that comprise the CSM, as part of Adaptive Element 2, would also facilitate an earlier and more effective diagnosis of recovery trends if and when needed to compare to specific targets for Adaptive Element 3. It is envisioned in Section 5.3 that the diagnostic assessment would at some future time identify causal factors that could inhibit recovery. **However, earlier identification of those factors, supported by hypotheses, and early data collection, as part of LTM, to support testing of those hypotheses, would support more timely adaptive management, should recovery fall short of goals.**

d. IR Completion Evaluation Framework, Appendix H of draft FS
Use of Statistics for decision-making, Y factors, Summary Statistics

As one of the terms agreed upon by the State, the methods for demonstrating effectiveness of the Interim Remedy in achieving RAOs and associated post-remedial SWACs will be presented in the FS and the principles for implementation will be developed and agreed upon by all parties in advance. A proposed approach is presented in the CPG's draft FS Appendix H, submitted to the agencies for review in in October 2019.

Preliminary review has indicated that the FS presents IR completion via a line of evidence approach with initial review on statistical attainment. The FS decision tree ultimately leads to designations of: IR complete, IR complete by weight of evidence, and IR not conclusively complete. The methods for categorization have a primary metric focused on statistical evaluation at the 95% upper confidence level (UCL) to determine that the RAO 1 Dioxin and PCB SWACs are at or below "threshold compliance levels", represented by ***"y" times 85 ppt*** for 2,3,7,8-TCDD and **"y" times 0.46 ppm** for total PCBs, respectively, with a high degree of confidence. If the statistical evaluation is not met, qualitative lines of evidence are then assessed to generate a determination on whether or not the IR has achieved the RAO goals. There are three main areas of concern in the proposed approach and these include: how the SWAC goals are characterized for this project, potential application of a "Y" factor on the 95% Upper Confidence Limit (UCL) to generate "compliance thresholds" that could be substantially different from the remedial targets, and finally, lack of consideration of other metrics from summary statistics of the post-remedial data distribution. These are described below.

Areas of Concern for the Department:

1. SWAC goals viewed as "non-absolute", Appendix H states: "The uncertainty inherent in the SWAC estimates is tolerable because the SWAC goals are not absolute thresholds for source control or acceleration of long-term recovery." It is further stated that this position is supported based on the projected SWAC estimates ranging from 75 ppt to 110 ppt using a RAL of 300 ppt and using the existing conditional simulation mapping model populated with existing sparse data.

Response: First, the Department views the RAO 1 SWAC remedial goals as absolute goals, not symbolic goals. The Department considers these SWAC goals as the benchmarks which identify "source" for this Interim Remedy by identifying the Remedial Action Levels (RALs) needed to attain RAO 1 SWACs goals. These are absolute goals because attaining the target SWACs to the extent feasible matters for the long-term recovery of this river, as previously described under FS comments on comparative analysis among alternatives. Lower post-remedial SWACs are predicted to reach future risk-based remedial goals sooner than higher post-remedial SWACs.

Second, the Department believes that much of the uncertainty of the future SWAC estimates will be controlled through several ways during IR implementation. These include: a. the much more comprehensive sediment bed data set to be generated by PDI and associated infill sampling, b. new bathymetry surveys to better inform and correlate sediment bed physical features with chemical characteristics, c. accounting for RAL effectiveness (i.e.,

anticipated post-remedial reduced range of contaminant concentrations and still incorporating some targeting error, d. use of performance standards and best management practices during construction (to limit targeting error to the extent feasible) and e. Collectively, the acquired design information and construction measures (CPG's LOE 1 – 4) are expected to translate to improved CSM understanding and use of project models to make new and improved contaminant concentration maps for remedial footprint design and implementation. In other words, we expect the project to reap the benefits of these earlier investments in the project so that the uncertainty experienced in current modeling predictions should not exist to the same degree during post-remedial conditions and assessments.

Third, it is noted that Appendix H identifies RAO 2 sediments targeted for remediation as subsurface sediment areas (6 inches to 1.5 ft.) outside of the RAO 1 footprint which are vulnerable to erosion and have 2,3,7,8-TCDD concentrations **at or above 2 times the RAL established to achieve the surface SWACs for RAO 1,** and/or have PCB concentrations of 2 ppm (2 times the established RAO 2 RAL for PCBs of 1 ppm). In other words, problematic sediment that could impede river recovery that are not already addressed by RAO 1.

While the Department accepts the proposal for PCBs, the Department cautions against the above approach for 2,3,7,8-TCDD given the often-unpredictable shifting of erosional and depositional areas of the river (as described under RI observations above) and the existing very high magnitude of dioxin concentrations in these areas relative to background and expected future risk-acceptable goals. If the surface RAL is 250 ppt, use of a subsurface RAL for dioxin of 2 or higher would equate to allowing up to 500 ppt or more of this contaminant to reside within just 6 inches of the sediment bed surface without any other controls. These areas pose a standing threat to river recovery and should be addressed in a more protective fashion. The Department advocates for use of similar 2,3,7,8-TCDD RALs for both RAO 1 and RAO 2 as this would *further support attainment of project RAO 1 SWACs and better safeguard a timelier recovery to risk-acceptable conditions*, because these additional sources are addressed in a more protective fashion. However, the order of operations for remedial footprint designation, with RAO 1 applied first, followed by RAO 2, must be maintained.

2. Y-factor as a method to address discrepancy between true post-remedial SWAC and post-remedial sample data SWAC

Response: At this time, the Department reserves comment on the use of a "Y" factor to generate future IR *compliance thresholds* for either 2,3,7,8-TCDD and/or total PCBs. The Department is willing to consider possible future use of a Y-factor if it is determined through PDI information that future high variability in post-remedial sediment surface concentrations cannot be avoided and is expected to present conditions beyond what currently-planned statistical methods can address without excessively generating either false positive and/or false negative errors. If a Y-factor is used, it should be derived using the future remedial design site characterization information (PDI and infill sampling, anticipated reduced concentration ranges by RAL application, anticipated targeting error) as previously described *and constrained by an agreed-upon degree of equivalency to the RAO 1 goals of 85 ppt for 2,3,7,8-TCDD and 0.46 ppm for total PCBs, considered acceptable by the Agencies. This means inserting a policy position on values reflective of "equivalence" to the RAO goals for 2,3,7,8-TCDD and PCBs*. In contrast, as currently proposed by the CPG (App H, Att. 1) "y" is mainly set by evaluating projected post-remedial variability to ensure that 95% of the 1,000 simulated UCLs are less than y times the SWAC goal. The Department cautions against allowing this more lenient evaluation approach for the Interim Remedy. Instead, the Department would want to see efforts to minimize "Y" by reducing the variability in the SWAC estimate, through methods such as compositing and iterative infill sampling during the PDI.

3. Use of Summary Statistics

Although the Department believes that compliance at the 95% UCL serves as the initial metric for evaluation, the Department believes there is value in utilizing summary statistics of confirmatory data to assist project decision-making. In descriptive statistics, it is standard practice to calculate summary statistics to describe the full distribution of a dataset. We recognize that environmental data are commonly non-normally distributed, and thus looking at the mean may not be the best way to describe the center of the distribution (i.e., the median may be more appropriate). Also, it is important to the Department that the SWAC goal is attained with the majority of the distribution less than 85 ppt for 2,3,7,8-TCDD and less than 0.46 ppm for PCBs, as was initially conceived during our October 2018 agreements at the outset of the IR path. By including other summary statistics, we would have a better idea of the likelihood that the true SWAC values are less than the RAO 1 goals. Given the variability of the dataset and the risk of falsely declaring success when the true mean values for either 2,3,7,8-TCDD or PCBs are greater than their respective RAO 1 goals, the Department believes consideration of summary statistics to be necessary as a metric to informing whether the RAO 1 goals have been achieved.

The Department has provided an example proposal that incorporates the use of summary statistics for IR decision making. The proposal builds upon the UCL and LCL metrics to designate whether the IR is complete, incomplete, or indeterminant by providing more pathways to scenarios prompting further review where the data are unclear to have met the RAO1 goal. Notably different from the FS proposal are the scenarios where the 95% LCL exceeds its appropriate threshold, such as greater than 85 ppt. These scenarios prompt further follow up action through **IR incomplete** and **IR indeterminant** designations because the majority of the distribution around the mean exceeds 85 ppt. Under the FS proposal, scenarios where the UCL are below the compliance threshold would lead to automatic IR complete designation and no further analysis would be required. A table is attached to better illustrate the Department's evaluation characterization. Overall the Department attached which considers summary statistics to be integral to IR completion determinations. This evaluation should occur before the performance of the other LOEs (pre-RI and IR implementation, i.e., LOE 1 – 3) begin to take precedence in the IR completion decision process. In summary, the Department recommends greater consideration of post-remedial summary statistics in the IR Completion Evaluation Framework.

4. Appendix H is considered overly focused on protecting against false negative outcomes i.e., the IR is judged incomplete when the SWACs were attained. Increased balance is needed to ensure that the decision framework equally protects against false positives, i.e., the IR is judged complete when the target SWACs were not been attained. False positives should be of greater regulatory concern, are considered the greater threat to the long-term success of this project, and therefore should receive greater emphasis in the Remedy Completeness Evaluation Framework.

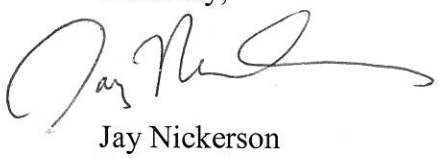
5. The nomenclature of FS Appendix H IR completion designations suggests that regardless of the statistical evidence or IR outcome, the IR will ultimately be judged as complete. Parties outside of the technical working group may find the designations confusing and falsely assume the project to be complete or successful relative to the RAOs, when this is not necessarily the case.

The Department has provided a matrix (attached) that includes the use of summary statistics to better direct completion determination.

Overall Conclusion: Given the uncertainties and other concerns identified in our comments above on the IR FS, at this time, the Department cannot agree with the selection of Alternative 2, design target of 85 ppt. Modeling performed for the FS indicated that remedies designed to meet SWAC targets of 65 and 75 ppt

achieved lower SWACs post-remedy, as intended, and that simulated SWACs representative of 10 years of post-dredging recovery were lower for the lower target SWACs. Thus, achievement of ultimate risk-based remedial goals would happen sooner if the SWAC target were lower than 85 ppt. These differences in outcome should be weighed against other balancing criteria; however, they are not currently considered in the draft FS. Uncertainties in implementation of the remedy should also be considered in the selection of a target SWAC, including the extent of potential recontamination of un-remediated and capped areas from activity in the upper 9 and lower 8 miles. Another key uncertainty is the possibility of accepting a remedy that has not actually achieved the SWAC target: this risk cannot be eliminated, given the unavoidable variability of a post-remedial SWAC estimate, but can be reduced by choosing a lower target SWAC.

Sincerely,



Jay Nickerson
Bureau of Case Management
Site Remediation and Waste Management Program
New Jersey Department of Environmental Protection

Attachments
cc. Michael Sivak, USEPA (e-copy)
Myla Ramirez, ETRA (e-copy)
Anne Hayton, BEERA, NJDEP (e-copy)